

Effects of Oestrus Synchronization and Various Doses of PMSG Administrations in Chios x Kivircik (F₁) Sheep on Reproductive Performances

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Abstract: The research was carried out to determine efficiency of oestrus synchronization in Chios x Kivircik (F₁) sheep under producers' conditions and the effects of PMSG dose on reproductive performance criteria. Research was conducted with 120 animals. During the mating season, the ewes were divided into 4 groups and 2 groups were administered with sponge + different doses of PMSG (400 and 500 IU), one group was administered only with sponge and one group became the control group. The mean live weight of Chios x Kivircik (F₁) sheep was 39 kg, their mean pregnancy rate was 72%, their litter size was 1.36 and the number of weaned lambs was 0.65. When, the variations between mean live weights in ewes were examined by age, it was found to be significant ($p < 0.01$). The effect of PMSG dose on pregnancy rate and litter size was significant ($p < 0.05$).

Key words: Chios x Kivircik (F₁), oestrus, synchronization, PMSG, pregnancy rate, Aydin

INTRODUCTION

Applications of oestrus synchronization, which enable the ewes to display oestrus in the desired periods, can be applied during oestrus season or anoestrus season. Although, factors such as addition of rams to the flock and heat-light arrangements are effective on oestrus synchronization, progestagens, estrogens, PGF₂ α and analogues, gonadotropin such as PMSG, GnRH and HCG, hormones like melatonin and their combinations are widely used in practice (Akcapinar, 1994; Yarali and Karaca, 2004). Controlling the hormonal mechanism of oestrus cycle with exogenous intervention forms the basis of these methods.

In oestrus synchronization, the compressive effect of progesterone hormone on the FSH secretion on the pituitary gland and its effect of stimulating oestrus when its level in the blood falls are utilized (Pabuccuoglu *et al.*, 1996).

With hormone administration in mammalian farm animals, animals are enabled to give birth simultaneously and to lamb also in anoestrus season by using hormone in the flock after involution. Besides, increasing the number of births in a certain time period, the number of lambs born after one gestation can be increased and the production of lamb meat can be corresponded to the period when demand and price are the highest in the

market. Facilities and economic benefits are obtained in terms of care, feeding and workforce planning again with oestrus synchronization in animals whereas, a uniform fattening material is obtained in terms of age and live weight and great facilities are obtained in the organization of the application of artificial insemination. In addition, with nonseasonal lambing, continuity can be ensured in milk production and sufficient number of sib or half-sib lambs born in identical time section can be obtained for scientific research (Askin, 1982).

When, the progestogen sponges were removed following a 12-16 days (mean 14) administration, an intramuscular PMSG (Pregnant Mare Serum Gonadotropin) injection antedates the onset of oestrus, increases ovulation rate and enables ovulations to converge. So far, many studies have been made on progestogen sponges or progesterone sponge + PMSG administration (Stancic, 1986; Gonzales *et al.*, 1988; Hamra *et al.*, 1989; Walker *et al.*, 1989; Zafracas *et al.*, 1992; Beck *et al.*, 1993; Driancourt and Avdi, 1993). However, the reaction of each breed to the kind, time and administration amount of hormone used is not identical. This is due to the fact that breeds have different reproductive traits (Soylu *et al.*, 2002; Gokcen *et al.*, 2002).

In a study, on the effects of various doses of PMSG in the ewes on oestrus and reproductive performance, the

data about oestrus rate and reproductive performance determined that PMSG did not have a statistically significant effect at different doses and the number of lambed ewes was found to be statistically significantly high in the control group than the groups administered with progestogen-containing sponge and different doses of PMSG (Unal *et al.*, 2002). At the end of a research, it was observed that uniform lambs could be obtained in the marketing period and that producers were greatly interested in the application (Karaca and Cemal, 2002). In the study, where they investigated the effects of use of progesterone and different doses of PMSG in Kivircik ewes on oestrus control and reproductive performance, Koyuncu *et al.* (2002) detected that oestracize were effectively synchronized and that reproductive performance displayed a significant increase. Ozturk and Elicin (1999) investigated the effects of exogenous hormone use during anoestrus period in crossbred sheep bearing Boorola genes on reproductive performance and determined that pregnancy, lambing and multiple birth rates were significantly high in the group under application. In the study, on supervising reproductive performance using exogenous hormone in Karakas sheep under producers' conditions in the Eastern Anatolian Region, Karakus and Askin (2007) concluded depending on their findings that some preliminary conditions were required for applying these applications under producers' conditions.

This study intended to investigate, the effects of administrations of intravaginal sponge impregnated with synthetic progesterone, followed by different doses of PMSG injections in Chios x Kivircik (F_1) sheep on oestrus and birth synchronization and superovulation and their benefits to be brought about for producers.

MATERIALS AND METHODS

The animal material of the project is composed of 120 Chios x Kivircik (F_1) sheep. The sheep were purchased from 3 different enterprises dealing with migrating sheep production and a new flock was composed. While, purchasing the animals, attention was paid to the fact that they were aged 3-4 had given birth at least once and display the phenotypic traits of Chios x Kivircik crossbred sheep and a homogenous flock was composed. No studies had been carried out on the material so far. The ewes were not given additional feed and they only grazed. The ewes were divided into 4 groups at the beginning of August, which is the mating season for the region. The experiment was composed of 4 groups, namely, control group, the group with only sponge insertion (for 14 days), group with sponge + 400 IU PMSG and group with sponge + 500 IU PMSG.

Within mating season, sponges containing 40 mg of fluorogestone acetate were inserted into the vagina. The inserted sponges were removed after having been left in the vagina for 14 days and PMSG was not injected to some of the randomly-selected animals whereas 400 IU PMSG was injected to some of them and 500 IU PMSG was injected intramuscularly to the rest of them. At the end of this period, the PMSG-injected animals were divided randomly and natural oestrus was applied. Births were monitored at the end of pregnancy and the ewes and lambs were weighed at birth.

The obtained data were analyzed in SAS (1999) program using the GLM procedure.

RESULTS AND DISCUSSION

Characteristics of live weight and reproductive performance of ewes are presented in Table 1 according to birth results. The mean live weight of Chios x Kivircik (F_1) sheep is 39 kg, the mean pregnancy rate is 72%, litter size is 1.36 and the number of weaned lambs is 0.65. When, the variations among the mean live weights of ewes were examined by age, they were found to be statistically significant ($p < 0.01$). The effects of PMSG dose on pregnancy rate and litter size were found to be statistically significant ($p < 0.05$; $p < 0.01$). According to control group, group with only sponge insertion and groups with administrations of 400 and 500 IU PMSG doses, the pregnancy rates were found as 60, 64, 72 and 79%, respectively and the litter sizes were found as 1.21, 1.25, 1.33 and 1.49, respectively. Although, the variations among enterprises regarding pregnancy rate, litter size and number of weaned lambs were found to be insignificant, it is striking that enterprise 2 clearly differed from other enterprises. Although, the effect of age on pregnancy rate, litter size and number of weaned lambs was found to be statistically insignificant, it was observed that these values increased as age increased.

Among the groups with only sponge insertion, with sponge insertion + 400 IU PMSG injection and sponge insertion + 500 IU PMSG injection in the research, it was observed that the administration of 500 IU PMSG particularly had a clear advantage in terms of pregnancy rate and litter size. Success in applications of synchronization depends on many factors. It can be stated that deviations, which cannot be underrated, also occurred among the results obtained from the studies conducted under various conditions. Pabuccuoglu *et al.* (1996) and Askin (1982) studies on Anatolian Merino and Akkaraman breeds, 91.69% of the total material administered with hormones for doses of 200, 400 and

Table 1: Characteristics of live weight and reproductive performance of ewes according to birth results

Characteristics	N	Live weight (kg)	Pregnancy rate	N	Litter size	No. of weaned lambs
Total	120	39.19±0.89	0.72±0.17	116	1.36±0.48	0.65±0.35
PMSG dose			*		**	
Control	30	38.69±0.89	0.60±0.08 ^a	19	1.21±0.07 ^a	0.51±0.36
0	21	37.85±0.75	0.64±0.06 ^b	23	1.25±0.06 ^a	0.53±0.33
400	32	38.96±0.86	0.72±0.06 ^c	35	1.33±0.06 ^b	1.06±0.33
500	37	39.75±0.95	0.79±0.07 ^d	39	1.49±0.07 ^b	1.21±0.39
Enterprise						
1	45	38.61±0.78	0.66±0.45	35	1.12±0.35	0.60±0.39
2	53	40.12±1.76	0.75±0.26	39	1.23±0.09	0.73±0.24
3	22	38.01±0.87	0.69±0.69	42	1.15±0.06	0.61±0.34
Age		**				
3	57	37.27±1.97	0.69±0.15	62	1.24±0.15	0.56±0.19
<4	63	42.24±1.42	0.73±0.16	54	1.36±0.04	0.68±0.19

Mean values in the same column followed by the same letter (s) are not significantly different; *p<0.05, **p<0.01

600 IU PMSG gave birth within 1 week. It is also stated here that breed and injected PMSG doses do not cause any different effects on synchronization. About 94.17% of the ewes from both genotypes, administered with exogenous hormone, lambled. The variations detected between different PMSG doses in two genotype groups in terms of lambing rate were not found to be significant apart from the variations between doses of 200 and 600 IU PMSG in Merino sheep (p<0.05). Accordingly, increases were observed in lambing rate as the PMSG dose was increased from 200-600 IU. In another research by Ak *et al.* (1995), Kivircik breed sheep were divided into four groups and the pregnancy rates were determined to be 68.2, 85.7, 45.0 and 40.6%, respectively whereas, the litter sizes were determined to be 1.53, 1.78, 1.56 and 1.38. In the study conducted by Askin (1982), the effects of PMSG were examined and the pregnancy rates were found as 74.4, 75.8, 71.9 and 72.4%, litter sizes as 1.03, 1.00, 1.22 and 1.48 and multiple birth rates as 2.8, 0.0, 13.6 and 40.0%, respectively in the groups containing mature females at 0, 250, 500 and 750 IU PMSG injections. On the other hand, in this study, the rate of 72% calculated in terms of pregnancy rate is low and at acceptable level.

In the locality of Denizli, the mating season for ewes begins at the end of July and is quite intensive in August. Accordingly, births take place in a time frame covering December and January. The mean rate of 72% calculated in terms of pregnancy rate in this study is in good agreement with the study (Ak *et al.*, 1995; Pabuccuoglu *et al.*, 1996; Murtiga and Mugerva, 1992; Koyuncu *et al.*, 2002; Cognie, 1990).

Among control group and the groups with only sponge insertion, sponge insertion + 400 IU PMSG injection and sponge insertion + 500 IU PMSG injection in the study, it was observed that the administration of 500 IU PMSG particularly had a clear advantage in terms

of lambing rate. Although, the lambing rates obtained according to PMSG doses administered in the research are in parallel to the similar results in the studies by Askin (1982), Pabuccuoglu *et al.* (1996), Murtiga and Mugerva (1992), Altinel *et al.* (1998) and Karaca and Cemal (2002), they are lower than the reports by Askin (1982), Ak *et al.* (1995) and Koyuncu *et al.* (2002). The values of 1.21, 1.25, 1.33 and 1.49 found in terms of litter size, respectively depending on PMSG doses are lower than those of the above-mentioned studies. In the studies carried out, it is stated that ostracize occur in a shorter period of time as the PMSG dose is increased and that it increases the number of lambs at birth (Askin, 1982; Pabuccuoglu *et al.*, 1996). Although, it is possible to increase the number of lambs at birth by increasing the hormone dose administered, problems are sometimes encountered particularly in the care of lambs and their survival rates.

Even though, the differences among enterprises in terms of pregnancy rate, litter size and number of weaned lambs are not statistically significant in the study, when the obtained values are examined, it is striking that enterprise 2 has a clear advantage over others. It can be stated that the obtained values are low in comparison to some studies on different breeds (Askin, 1982; Gokcen *et al.*, 2002; Unal *et al.*, 2002). It can be expressed that this is due to different care and feeding practices in the enterprises where investigations were made.

CONCLUSION

Production of uniform lambs primarily for marketing period by oestrus synchronization within ordinary mating season and depending on this, by the synchronization of births taking place within a considerable time frame in Chios x Kivircik (F₁) sheep has been put forward in this study. Accordingly, producers can utilize workforce more efficiently and produce homogenous lambs in terms of age and live weight particularly in marketing period.

Although, various and a number of studies have been made with respect to oestrus synchronization, it is seen that hormone administration is still not widely used in sheep production today. Conducting the research in producers' flocks has enabled the use of hormones for oestrus synchronization to be transferred to practice. With synchronization practices and by arranging births according to the most convenient time for producers, maximum profitability can be attained. Thus, studies to be made on exogenous hormone use under producers' conditions should be accelerated and care and feeding opportunities should be improved in order to attain more success in practices.

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